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Inventor(s): OHARA NAOYUKI
Applicant(s): MATSUSHITA ELECTRIC IND CO LTD
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Abstract

PURPOSE:To improve a small turn character and to improve a stability due to the low center of a gravity by arranging two equal storage batteries at the right and left of a fan motor, and shortening the overall length of a cleaner main body.

CONSTITUTION:A fan motor 34 is arranged in an approximately central part at the rear side of a dust-absorbing room 33, and it is arranged approximately on a straight line with an inlet port. Two equal storage batteries 35 are arranged at the right and left of the motor fan 34, and for such a reason, the overall length of the main body can be shortened, and the small turn character can be improved. Along with it, the ratio of a traveling roller 56 interval to the position of the center of the gravity can be made small, the center of the gravity can be made low, and a traveling stability can be also improved. Further, since the fan motor 34 and a suction port are on the straight line and, simultaneously, an exhaust port can be also located on the straight line, a suction performance can be also improved. The storage batteries 35 can be installed by removing the cover of a case 31 top surface, and the whole does not need to be disassembled.

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⑭ 発明の名称 蓄電池式電気掃除機

⑯ 特 願 昭63-34887

⑰ 出 願 昭63(1988)2月17日

⑱ 発 明 者 尾 原 直 行 大阪府門真市大字門真1006番地 松下電器産業株式会社内

⑲ 出 願 人 松下電器産業株式会社 大阪府門真市大字門真1006番地

⑳ 代 理 人 弁理士 森 本 義 弘

明 細 書

1. 発明の名称

蓄電池式電気掃除機

2. 特許請求の範囲

1. 吸塵室とファンモータと蓄電池とこれらを取りめ走行ローラを有する主体ケースとを備え、前記蓄電池を同一の2個で構成し、前記蓄電池をそれぞれ前記ファンモータの左右に配設した蓄電池式電気掃除機。

3. 発明の詳細な説明

産業上の利用分野

本発明は蓄電池を内蔵した床移動型の家庭などで使用される電気掃除機に関するものである。

従来の技術

従来、蓄電池を内蔵した電気掃除機としては、ハンド型あるいはスティック型の電気掃除機が一般的であり、一部に小容量(電圧12Vまで)の蓄電池を内蔵した床移動型が提案されているだけであった。その構造を第6図および第7図に基づいて説明する。第6図はハンド型電気掃除機の一般的

な構造を示すもので、1は合成繊維の不織布などからなるフィルタ体2を収めた吸塵室で、その前方に吸込口3を設けてある。4はファンモータ5、蓄電池6および制御回路基板7を内蔵し、その上方にスイッチ8とハンドル9を設けて左右に2分割されるケースをビス締めして構成した掃除機本体である。蓄電池6は、ハンドル9の下方でファンモータ5の後方に配設されて隔壁10で囲まれ、後方に蓋体11で開閉自在に構成した開口12を設けた収納室13に収められている。また、吸塵室1と掃除機本体4は、結合面下方に設けた係合部14で互いに係止され上方に設けた図示しない尾錠によって着脱自在に一体化結合しているものである。

第7図は床移動型として提案された例を示すもので、15はフィルタ体16を収めた吸塵室で、その前方に図示しない吸込口を設けている。17はファンモータ18および蓄電池19を内蔵し、その上方にスイッチ20およびハンドル21を設け、左右に2分割されるケースをビス締めして構成した掃除機本体である。蓄電池18は、ハンド型電気掃除機が電

圧4～8Vであるのに比べて8～12Vと大きく、さらに、重さ、大きさともに増加している。この蓄電池19の配置場所はハンド型と同様に、ハンドル21の下方でファンモータ18の後方になっている。ファンモータ18はその前後をサポートゴム22、23を介して支持リブ24、25で保持され、その前面はフィルタ体16後面に圧接されている。また、掃除機本体17の後面下方に2個の走行ローラ26、吸塵室15の下面にキャスターローラ27が設けられている。さらに、吸塵室15と掃除機本体17は、結合面下方に設けた係合部28で互いに係止され上方に設けた図示しない尾錠によって着脱自在に一体化結合しているものである。

発明が解決しようとする課題

このような従来の構成では、吸込力を強くするために高電圧、高容量の蓄電池を掃除機本体に内蔵しようとするれば、ハンド型では重量の面で実用性がなく、また、床移動型でも従来のような構成では走行ローラ26間の幅寸法に比べて全長が長くなり、そのため小回りがきかず走行性の悪い形態

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気掃除機は、吸塵室とファンモータと蓄電池とこれらを取り囲む走行ローラを有する主体ケースとを備え、前記蓄電池を同一の2個で構成し、前記蓄電池をそれぞれ前記ファンモータの左右に配設したものである。

作用

上記構成により、走行ローラ間にファンモータおよび2個の蓄電池をそれぞれ配設して掃除機本体の全長を長くすることなく、小回り性を確保するとともに本体重心と走行ローラ間隔の比率を小さくして低重心化をはかり走行安定性を向上させるものである。また、ファンモータは掃除機本体のほぼ中央に位置し、従来のように後方に蓄電池がないので、吸引時の通気路抵抗も少なくすることができ、性能効率を高め、さらに、ファンモータの左右に同一の蓄電池をそれぞれ配設するので、重心が中央部になり、持ち運び時の安定性が確保できるとともに、この2個の蓄電池を並列接続することによって一個の蓄電池にかかる電流負荷を小さくでき、蓄電池の放電エネルギー量を高めて

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になってしまうという問題があった。また、蓄電池には寿命があるため交換の必要性があり、ハンド型では本体の後方もしくは下方に設けた開口13から蓄電池6を出し入れするようにしていたが、床移動型としては、このような出し入れをする方法が提案されておらず従来のものでは掃除機本体を分解しなければならない構成で、サービス性の点で著しく悪いという問題があった。

本発明は上記従来の問題を解決するもので、従来の蓄電池式電気掃除機ではコード式電気掃除機に比べて吸込力が約1/5～1/7と弱く、また、用途が限定されて一般家庭内の全域を掃除することができなかったものを、容量の大きな蓄電池を内蔵できる掃除機本体構成とすることによってコード式電気掃除機の70%程度の吸込力(約100W)を15分～30分間持続できる能力を有する蓄電池式電気掃除機を実現することを目的とするものである。

課題を解決するための手段

上記課題を解決するために本発明の蓄電池式電

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使用できるものである。

実施例

以下、本発明の一実施例について図面に基づいて説明する。

第1図～第3図は本発明一実施例を示す図である。第1図～第3図において、31は掃除機本体で、上下2体をねじ締め固定して構成し、その前側に紙袋などからなるフィルタ体32を収納した吸塵室33を設け、後方のほぼ中央部にファンモータ34およびこのファンモータ34の左右に同一の2個の蓄電池35をそれぞれ配置して収めている。ファンモータ34は防振ゴム36、37を介して支持壁39、40で前後を挟持され、かつ前面は吸塵室33に気密に圧接されている。蓄電池35は掃除機本体31の上面に開口41を有し壁面42で囲み保持リブ43を設けた収納室44に収められており、主体ケース45aに対して着脱自在に構成した蓋体45bで上方を覆っている。また、蓄電池35の外部端子46と圧接する接点ばね47を設けてファンモータ34とリード線と並列に結線している。また、蓄電池35は図示しない充

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電器を掃除機本体31に設けた充電端子(図示せず)に結合することによって充電できる構成にしている。掃除機本体31の前方には、吸塵室33を開閉し、吸気孔48、吸気孔パッキン49および把手部50を設けたフロントカバー51を框着している。掃除機本体31の後方には発泡ウレタンなどからなる排気孔パッキン52で覆った排気孔53およびレスト部54が形成されており、その下面には、前方に1個のキャスターローラ55、後方には左右に2個の走行ローラ56が回動自在に取り付けられている。

次に、蓄電池35(鉛シール型蓄電池)の構成について第4図に基づいて説明する。第4図において、57はABSなどの合成樹脂からなるケースであり、58はケース57に接着固定した蓋体である。ケース57内の蓋体58で密閉した空間内には希硫酸からなる電解液を充填させており、電解液中に PbO_2 (酸化鉛)からなる正極板59とPb(鉛)からなる負極板60の間を隔離するセパレータ61を設けている。62は隣接するセル間の正極板59と負極板60を直列に電氣的に接続するための接続端子

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ち運び時の安定性を確保することができる。また、蓄電池35を並列接続することによって、直列接続の場合に比較して、一個当りにかかる電流負荷を小さくできるので、蓄電池35の放電エネルギー量を高めて使用でき、重量効率、容積効率を向上させることができる。

発明の効果

以上のように本発明によれば、簡単な構成で床移動型の蓄電池式電気掃除機の本体性能を高めて、走行時および持運び時の掃除機本体の安定性および小回り性を確保し、かつ蓄電池エネルギーを効率良く活用し得るものであり、性能および使い勝手を向上させる上で工業的価値の大なるものがある。

4. 図面の簡単な説明

第1図は本発明の一実施例を示す蓄電池式電気掃除機の平面図、第2図は第1図におけるA-A'縦断面図、第3図は第1図におけるB-B'縦断面図、第4図は本発明の一実施例における蓄電池の構成を示す部分断面斜視図、第5図は本発

であり、46は外部端子である。

次に、電気回路の構成を第5図に基づいて説明する。第5図において、2個の蓄電池35はファンモータ34と並列に接続され、手元スイッチ S_1 によってリレー63を介して電源スイッチ S_2 を開閉し、ファンモータ34の起動、停止を行わせる。

さらに、ファンモータ34に約300 Wの入力を電圧24Vの蓄電池35で供給しており、一個当りの放電電流は初期値で約6.5 Aとなっている。

以上の構成において、その動作について説明する。第1図～第3図において、ファンモータ34は吸塵室33の後方ほぼ中央部に配し、吸気孔48とはほぼ一直線上に設けてあるので、吸引時の通気抵抗を少なくして性能を向上させることができるものである。さらに、2個の蓄電池35をファンモータ34の左右にそれぞれ配設しているため、本体全長を長くすることなく小回り性を確保し、かつ重心位置と走行ローラ間の比率を小さくし低重心化することによって走行時の安定性を良くするとともに掃除機本体の重心がほぼ中央部になるので、持

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明の一実施例における電気回路構成を示す回路図、第6図および第7図はそれぞれ従来の蓄電池式電気掃除機の一般的な構造を示す縦部分断面図である。

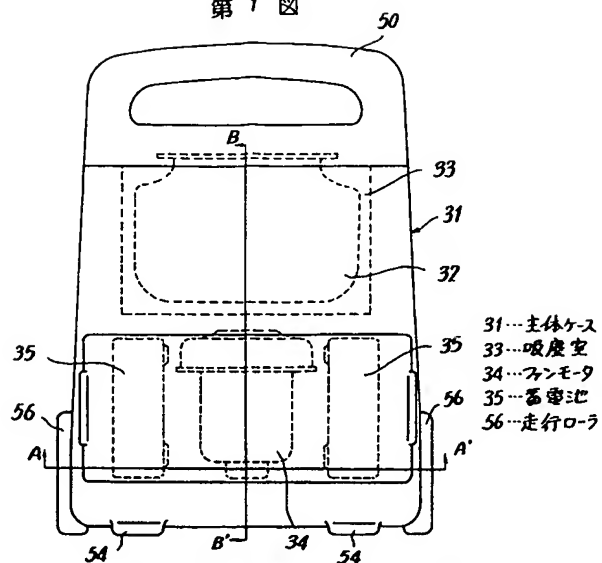
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代理人 森 本 義 弘

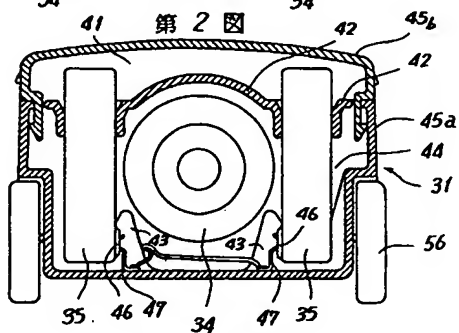
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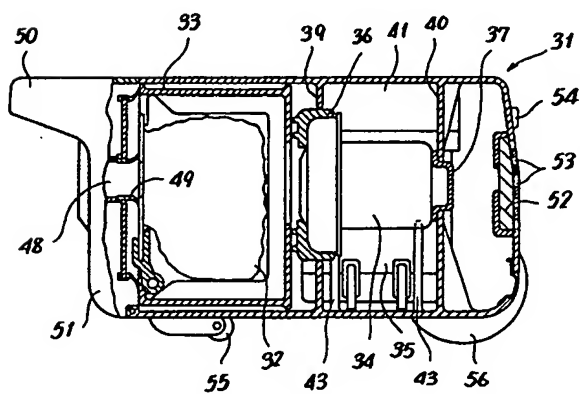
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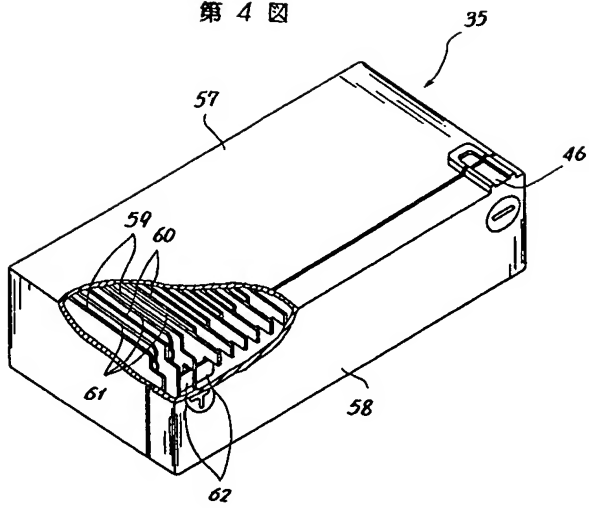
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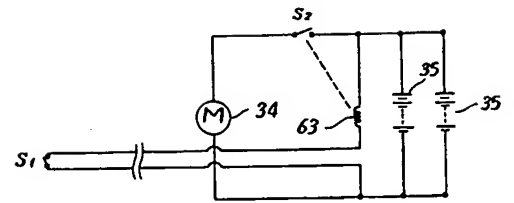
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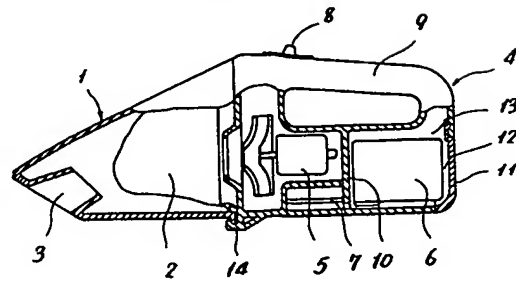
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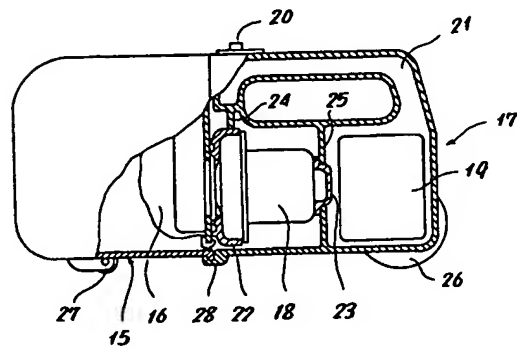
第 5 図



第 6 図



第 7 図



**TRANSLATION FROM JAPANESE
PATENT SPECIFICATIONS 1-209038**

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(54) Name of the Invention: Battery Powered Electric Vacuum Cleaner
(21) Application No. 63-34887
(22) Filing Date: February 17, 1988
(72) Inventor: Naoyuki Ohara, Osaka-fu, Kadoma-shi, Ohazakadoma 1006, with Matshushita Electric Industrial Co., Ltd.
(71) Applicant: Matshushita Electric Industrial Co., Ltd., Osaka-fu, Kadoma-shi, Ohazakadoma 1006
(74) Agent: Yoshihiro Morimoto

Specifications

1. Name of the Invention

Battery powered electric vacuum cleaner.

2. Scope of the Patent Claim

Claim 1: A battery powered electric vacuum cleaner with a main case having a running roller and equipped with a vacuum chamber, a fan motor, and a storage battery, wherein said storage battery is composed of 2 identical elements located on either side of said fan motor.

3. Detailed Explanation of the Invention

Industrial Field of Application

The present invention pertains to a floor-running electric vacuum cleaner equipped with an internal storage battery used in the home.

Prior Arts

Conventionally, as examples of electric vacuum cleaners equipped with internal storage batteries, there are generally the hand or stick varieties, but for some types, portable electric vacuums equipped with a low capacity (up to 12 volts) internal storage battery for use on floors have only been suggested. Based on figure 6 and figure 7, an explanation of the structure of such vacuums follows. Figure 6 shows the general structure of the hand variety of electric vacuums, wherein 1 is the vacuum chamber containing a filter 2 made from synthetic non-woven fabric, and to the front of which is provided a suction port 3. 4 is the main body of the vacuum cleaner which is comprised of a case which divides into left and right halves fastened together with screws and which contains the fan motor 5, the storage battery 6, and the control panel 7, over which is provided a switch 8 and a handle 9. Enclosed by the partition 10 under the handle 9 and to the rear of the fan motor 5, the storage battery 6 is held within the compartment 13 having an opening 12 constructed in such a manner as to allow it to be opened or closed freely with the use of a lid 11 at the rear. Furthermore, the vacuum chamber 1 and the vacuum cleaner's main body 4 are united at the bottom side of the joining face with a latch 14 and a clasp provided at the top side (not shown in figure) which mutually engages each side with the other in such a manner as to allow the elements to be freely joined or separated with one another.

Figure 7 shows an example of the suggested floor-running variety. 15 is the vacuum chamber containing the filter 16. In front of that is a suction chamber which is not shown in the figure. 17 is the main body of the vacuum cleaner which is comprised of a case which divides into left and right halves fastened together with screws and which is equipped with an internal fan motor 18 and storage battery 19, over which is provided a switch 20 and a handle 21. The storage battery 19 is increased in size and weight to 8 - 12 v compared to the 4 - 8 v batteries used in the hand variety of electric vacuum cleaners. The positioning of this storage battery 19 is the same as with the hand variety below the handle 21 and to the rear of the fan motor 18. The fan motor 18 is held at the front and back by supporting ribs 14 and 15 with the application of supporting rubber 22 and 23 in such a manner as to have the front of the fan motor form a pressure-contact with the filter 16. In addition, 2 running rollers are provided at the rear bottom of the main body of the vacuum cleaner 17, and casters 27 are provided at the bottom face of the vacuum chamber. Furthermore, the vacuum chamber 15 and the vacuum cleaner's main body 17 are united at the bottom side of the joining face with a latch 28 and a clasp provided at the top side (not shown in figure) which mutually engages each side with the other in such a manner as to allow the elements to be freely joined or separated with one another.

Problems the Invention Attempts to Solve

With this type of conventional construction, if a high voltage or a high capacity storage battery is incorporated internally into the main body of the vacuum cleaner, the hand variety is impractical from a weight perspective. Furthermore, even with the floor running variety, with this type of conventional construction, the overall length of the unit becomes long in

comparison to the distance between the running rollers 26, and therefore the problem of poor maneuverability arises as the unit cannot be maneuvered well in tight places. In addition, as the storage batteries have a certain life span, the storage battery 6 was removed from the opening 13 provided to the rear or bottom of the main unit and replaced in the hand variety, but with the floor running variety, this type of removal and replacement has not been suggested, such that with the conventional construction, it requires the disassembly of the main body of the vacuum cleaner. This is a huge serviceability problem.

The present invention solves the above noted problems. The purpose of the invention is to convert the conventional battery powered electric vacuum cleaner, the use of which is limited such that all of the areas of the house could not be cleaned and which is weak with only 1/5 to 1/7 of the suction power of a cord powered electric vacuum cleaner, into battery powered electric vacuum cleaners having the ability to maintain 70% of the suction power (100 w) of a cord powered electric vacuum cleaner for 15 - 30 minutes by adopting a configuration for the main body of the vacuum cleaner which makes possible the internal incorporation a large, high capacity storage battery.

Means to Solve the Problems

To solve the above problems, the vacuum cleaner of the present invention has a main case having a running roller and equipped with a vacuum chamber, a fan motor, and a storage battery, wherein said storage battery is composed of 2 identical elements located on either side of said fan motor.

Effects

With the above construction, the fan motor and the 2 storage battery elements are placed respectively between the running rollers, which does not increase the overall length of the main body of the vacuum cleaner so that maneuverability is maintained. Furthermore, the ratio between the center of gravity of the main body and the distance between the running rollers is reduced, promoting a low center of gravity and improved running stability. Moreover, the fan motor is positioned almost at the center of the main body of the vacuum cleaner, and since the storage battery is not at the rear as in conventional varieties, it was possible to decrease the resistance in the air passage during suction, increasing performance and efficiency. In addition, since identical storage battery elements are positioned on the left and right sides of the fan motor, the center of gravity is in the center of the unit and by connecting the 2 storage battery elements in parallel, the current load on any one of the storage battery elements can be reduced, increasing the discharge energy of the storage battery.

Working Examples

The following is an explanation of a working example of the present invention based on the figures.

Figures 1 - 3 show a working example of the present invention. In figure 1 - 3, 31 is the main body of the vacuum cleaner, constructed of an upper element and a lower element fastened together with screws. A vacuum chamber is provided in the foreside of the main body and contains a filter 32 made of a paper bag or the like. The fan motor 34 and the 2 identical storage battery elements 35 on the left and right sides thereof are positioned in the rear side of the main body at almost the center. The fan motor 34 is supported in the front and back by the sandwiching effect of the supporting wall 39 and 40 with the use of anti-vibratory rubber 36 and 37, and the front face is attached to the vacuum chamber 33 in an air tight manner with the application of pressure. The storage battery 35 is contained in the compartment 44 equipped with a retaining rib 43 and enclosed by a wall 42 and which has an opening 44 in the upper face of the vacuum cleaner's main body 31, and is further covered by a lid 45b constructed in a manner allowing it to be freely attached or removed from the main case 45a. Moreover, an external terminal 46 on the storage battery 35 and a contact spring making contact under pressure are provided, and the fan motor 34 and the lead are connected in parallel. In addition, the vacuum cleaner is constructed such that the storage battery 35 can be recharged by connecting the charging terminal with the charger (not shown in figure) provided in the main body of the vacuum cleaner 31. In the front of the main body of the vacuum cleaner the front cover is mounted so as to be able to swing, and it also opens and closes access to the vacuum chamber 33, and is provided with an intake opening 48, packing for the intake opening 49, and a handle 50. A rest (pedestal) 54 and an exhaust opening 53, covered by packing 52 for the exhaust opening made from urethane foam, are formed at the back side of the main body of the vacuum cleaner 31. On the bottom face of the vacuum cleaner at the front is 1 caster 55 and at the back are 2 running rollers 56 installed so as to be able to freely rotate.

Next is an explanation of the storage battery 35 (sealed lead type storage battery) based on figure 4. In figure 4, 57 is a case made of ABS or other synthetic resin and 58 is a lid adhered and fixed to the case 57. The void within the case 57 sealed with the lid 58 is filled with an electrolytic solution made from diluted sulfuric acid. In the electrolytic solution is a positive plate 59 made of PbO₂ (lead oxide), a negative plate 60 made of Pb, and a separator 61 which insulates the two from one another. 62 is a connecting terminal for the purpose of electrically connecting the positive plates 59 and negative plates 60 between the neighboring cells, and 46 is the external terminal.

Next is an explanation of the electrical circuit based on figure 5. In figure 5, the 2 storage battery elements 35 are connected in parallel to the fan motor 34, and with the switch S1, the power switch S2 is opened/closed by means of the relay 63, and starting and stopping of the fan motor 34 is carried out.

Furthermore, the 24 v storage battery 35 supplies the fan motor 34 with approximately 300 w of power, and each element approximately discharges an initial 6.5 A.

The following is an explanation of the operation of the above construction. In figures 1 - 3, the fan motor 34 is positioned to the rear of the vacuum chamber 33 almost in the center of the unit, and since it is provided in a straight line above the intake opening 48, the air flow resistance in the air passage is reduced during suction, and the performance of the unit is enhanced. Furthermore, since the 2 elements of the storage battery 35 are positioned to the left and right of the fan motor respectively, the overall length of the unit is not increased and maneuverability is maintained. Moreover, by lowering the center of gravity by decreasing the distance between the position of the center of gravity and the running rollers, the stability of the unit is increased while running, and since the center of gravity of the main body of the vacuum cleaner is nearly in the center of the unit, stability during the carrying of the unit is assured. In addition, in comparison to a connection in series, the electrical load on each of the 2 elements can be decreased, therefore the discharge energy of the storage battery 35 is increased under use and the weight efficiency and volume efficiency can be increased.

Effects of the Invention

As illustrated above, with the present invention, the performance of the main body of floor-running-battery-powered electric vacuum cleaners is increased, stability while running and carrying is assured, as well as maneuverability maintained. Moreover, it is possible to use the energy of the storage battery in a very efficient manner, while increasing performance and ease of use. In addition, the present invention has great industrial value.

4. Simple Explanation of the Figures

Figure 1 is a top view showing a working example of a battery powered electric vacuum cleaner of the present invention. Figure 2 is a cross-sectional view along the plane A - A' in figure 1, while figure 3 shows a cross-sectional view along the plane B - B' in figure 1. Figure 4 is a partial cross-sectional perspective view of the storage battery in a working example of the present invention. Figure 5 is a circuit diagram showing the construction of the electrical circuit in a working example of the present invention. Figure 6 and figure 7 respectively show vertical partial-cross-sectional views of the general construction of conventional battery-powered electric vacuum cleaners.

- 45a. Main Case
- 33. Vacuum Chamber
- 34. Fan Motor
- 35. Storage Battery
- 36. Running Rollers

Agent: Yoshihiro Morimoto

Keyed Numbers in Figure 1.

- 31. Main Case
- 33. Vacuum Chamber
- 34. Fan Motor
- 35. Storage Battery
- 56. Running Rollers